

Remarks

Claims 29-37, 40-46, and 48 are pending in the application. Applicant requests the Examiner reevaluate the rejections of the pending claims in view of the following remarks.

Claims 29-37, 40-46, and 48 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 5-10, 12-16 and 19 of U.S. Patent No. 5,990,559. However, applicant has filed a terminal disclaimer in response to the previous office action relating to this very patent. As such this rejection should be withdrawn.

Claims 29-37, 40-46, and 48 also stand rejected as anticipated and/or obvious in view of the previously cited Nakamura reference as well as the newly cited Inaba reference either alone or in combination. In particular, independent claim 29 has been rejected as anticipated in view of Nakamura while independent claims 40 and 44 have been rejected as anticipated in view of Inaba.

With regard to the rejection of claim 29, the Examiner literally copied the previous rejection of claim 29 (see Office Action mailed 3/25/05) as anticipated in view of U.S. Patent No. 6,232,629 to Nakamura without addressing Applicants arguments relating to the teachings of Nakamura as compared to what is recited in claim 29 submitted in the previous response. As such the rejection is not specific.

In the event that a rejection of the claims is maintained with respect to the prior art, or a new rejection made, Applicants respectfully request identification in such asserted references of elements which allegedly correspond to limitations of the claims in accordance with MPEP §706 and 37 C.F.R §1.104(c)(2). In particular, 37 C.F.R

§1.104(c)(2) provides that the pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified.

Referring to 37 C.F.R. §1.104(c)(2), it is stated that the Examiner must cite the best references at their command. When a reference is complex or shows or describes inventions other than that claimed by Applicants, the particular teachings relied upon must be designated as nearly as practicable. **The pertinence of each reference if not apparent must be clearly explained for each rejected claim specified.** Applicants respectfully request clarification of the rejections of claim 29 with respect to specific references and specific references teachings therein pursuant to 37 C.F.R.

§1.104(c)(2).

Applicant requests that the Examiner reconsider this rejection in view of the remarks that follow for at least the reason that the cited reference does not teach or suggest all of the elements of the pending claims with sufficient detail to anticipate and/or render the claims obvious.

The pending claims are anticipated "only if each and every element as set forth in the claims are found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 29 recites an integrated circuit that includes a semiconductive substrate and a roughened platinum layer over the substrate with the roughened platinum layer comprising columnar platinum pedestals terminating in dome-shaped tops. Claim 29 is

allowable for at least the reason that the cited reference does not teach or suggest these features.

Nakamura does not teach or suggest all the features of claim 29. In the Office Action the Examiner has directed the applicant to items 102 and 112 of Nakamura for the teaching of a roughened platinum layer comprising columnar pedestals terminating in dome-shaped tops. Applicant has reviewed those items as they exist in Figs. 3B and 31 in the context of Nakamura's disclosure and cannot identify a description of a roughened platinum layer over the substrate, nor can a roughened platinum layer comprising columnar pedestals terminating in dome-shaped tops be identified.

For example, referring to Fig. 3B, which references item 112 in the context of the specification (col. 1, lines 45-55 and col. 2, lines 5-10 and lines 2-25) as a platinum layer 112 that is described to be formed on a polysilicon plug 110. When referencing Fig. 3B, Nakamura describes that platinum layer 112 is formed directly on a polysilicon plug 110 so that platinum and the polysilicon form a silicide. (Column 2, lines 5-7). Furthermore, Nakamura recites to “resolve above described problems, there is a case that a tantalum layer which does not react with the platinum layer 112 is formed on the poly silicon plug 110, then the platinum layer 112 is formed thereon”. Nakamura then describes that the “surface of the tantalum layer 113 maintains roughness of the surface of the poly silicon plug 110, as shown in Fig. 4A”. (Column 2, lines 28-31). Item 112 of Fig. 3B is neither taught nor suggested by Nakamura to be a roughened platinum layer. It stands to reason that this roughened platinum layer does not have columnar platinum pedestals terminating in dome-shaped tops.

Platinum layer 112 is also described by Nakamura with reference to Fig. 31 in the context of col. 11, specifically, lines 17-35 of col. 11. In this section Nakamura describes,

A platinum layer 112 is formed on the iridium oxide layer 111. So that, the platinum layer 112 is oriented axially. Then a PZT layer 114 is formed as a ferroelectric material, also a platinum layer 116 is formed thereon as an upper electrode. Thus, a memory device is formed. That is, in this embodiment, a middle layer is formed by the iridium oxide layer 111 and the platinum layer 112.

In according to this embodiment, the platinum layer 112 does not contact with the poly silicon plug 110 directly. Further, the platinum layer 112 is formed on the iridium oxide layer III which has characteristics that the upper surface is flattened even though condition of the under layer is in rough. Therefore, a PZT layer having excellent ferroelectric characteristics can be obtained because of the platinum layer 112 is oriented axially. Also, better characteristics is able to obtained, since a low dielectric oxide is not formed to a boundary between the iridium oxide layer 111 and the poly silicon plug 110.

An iridium layer or an alloy layer made of platinum and iridium can be a substitution of the platinum layer 112, 116.

Applicant can find no teaching or suggestion of a roughened platinum layer with reference to Fig. 31 in the context of col. 11, lines 25-37. It is believed that the iridium oxide layer 111 is taught to be roughened, not the platinum layer. As such, Nakamura cannot anticipate claim 29 for at least the reason it does not teach or suggest all the elements of claim 29. Furthermore, Nakamura neither teaches nor suggests columnar platinum pedestals terminating in dome-shaped tops. Nor does Nakamura teach or suggest the production of these pedestals or dome-shaped tops, nor is there any teaching or suggestion that would render an apparatus having these pedestals or dome-shaped tops obvious. For at least the reason that Nakamura does not teach or suggest a roughened platinum layer comprising columnar platinum pedestals terminating in dome-shaped tops, Nakamura cannot anticipate claim 29.

Claims 30-37 depend from claim 29 and are allowable for at least the reasons stated above regarding claim 29, as well as their own patentable features.

For example, claim 30 recites that the platinum layer is continuous over a prespecified area of the substrate that comprises at least about 4×10^6 square angstroms, and that the platinum pedestals can be at least about 300 angstroms tall within the area. The Examiner has rejected these claims as obvious for at least the reason that these features are the product of result effective variables and/or they are a matter of design choice and the Examiner has recited the cases *In re Boesch* and *In re Dailey* to support the rejection.

However, the application of these cases is misplaced. More particularly a finding that the recited features are result effective variables and/or matters of design choice is inapplicable to the recited claims in view of the limited teachings of the reference and amounts to hindsight reconstruction of the claimed subject matter. In order to apply the law of *In re Boesch* there needs to be a result effective variable. It is understandable that Nakamura neither teaches nor describes any such result effective variable for at least the reason it does not describe a roughened platinum layer or any methodology for producing a roughened platinum layer. As such, any result effective variable that can be applied to acquire platinum pedestals, dome shaped tops, and/or platinum pedestals of certain size is not disclosed in the cited reference. Furthermore, as a matter of design choice, there would need to be a result effective variable that the applicant could apply to accomplish this design choice. As stated above, there is no result effective variable described by the cited references. For at least these reasons,

the claims depending from claim 29, as well as claim 29 itself, are not obvious in view of the cited references.

Referring now to the rejection of claims 40-46 and 48 as anticipated by Inaba, with reference to the arguments above Inaba, like Nakamura does not teach or suggest all the elements of these claims.

Claim 40 recites a capacitor that includes a first capacitor electrode and a second capacitor electrode with a dielectric layer between the first and second capacitor electrodes. Claim 40 goes on to recite that at least one of the first and second capacitor electrodes comprises a roughened platinum layer with the roughened platinum layer having a thickness of from about 400 angstroms to about 1,000 angstroms and comprising platinum pedestals that are at least about 300 angstroms tall and terminate in dome-shaped tops. Claim 40 is allowable for at least the reason that Inaba does not teach or suggest: a roughened platinum layer; platinum pedestals; platinum pedestals having dome-shaped tops; and/or platinum pedestals having a specific thickness or height.

Referring to sections 25-28 in the context of Figures (a) and (b) as directed by the Examiner, Inaba does not teach or describe a roughened platinum layer, but rather a roughed PZT layer which is defined by Inaba to be lead zirconate titanate (see, e.g., under "PROBLEM TO BE SOLVED" on page 2 of Inaba). This is further reinforced by sections 25-26 reproduced below in the context of section 21 in view of Figures (a) and (b) depicted on page 2 of Inaba.

Referring to Figures (a) and (b) Inaba depicts a PZT thin film of columnar crystals 1 (see, e.g. section 21) formed on a Pt substrate layer 3. The Pt substrate

layer 3 as depicted is flat at the interface with the PZT film 1. The Pt substrate layer 3 is prepared according sections 25-26 of Inaba reproduced below.

Next, a 30-nm Ti thin film was formed on the board thus obtained by means of a DC sputter with the deposition rate set at 179 Å/min, using Ar at 30 sccm and 800 W, with the board at room temperature. Then, **a Pt thin film having a thickness of 200 nm was formed** with the deposition rate set at 290 Å/min, using Ar at 30 sccm and 500 W, with the temperature of the board at 450 °C (comparative example 1), 300 °C (comparative example 2) and at room temperature (example 1). In the case of example 2, electron-beam vapor deposition was used in place of the DC sputter to form a Ti thin film (at a deposition rate of 50 Å/min) and **a Pt thin film (at a deposition rate of 20 Å/min) to form the same respective thickness as those described above.**

The crystal grain diameter of each Pt film was found to be as shown in TABLE 1. Moreover, the crystal grain diameter was measured in the usual manner. The deposition surface was observed by means of a scanning electron microscope in order to measure the grain diameter, and the mean value was then obtained. (Sections 25-26 of Inaba).

Applicant can find no reference to the Pt thin film described by Inaba being roughened and/or terminating in dome-shaped tops as expressly recited in claim 40. For at least the reason that Inaba does not teach or suggest all the elements of claim 40, claim 40 is allowable.

Claims 41-43 depend from claim 40 and are allowable for at least the reasons given above regarding claim 40.

Claim 44 recites a capacitor that includes a first capacitor electrode, a second capacitor electrode and a dielectric layer between the first and second capacitor electrodes. Claim 44 goes on to recite that at least one of the first and second capacitor electrodes comprises a roughened platinum layer with the roughened platinum layer having a continuous surface characterized by columnar platinum pedestals having heights greater than or equal to about one-third of a total thickness of the platinum layer with the platinum pedestals terminating in dome-shaped tops.

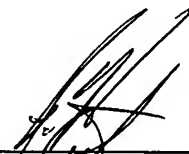
As described above, the cited references do not teach or suggest all the features of claim 44. For example, Inaba does not teach or suggest: a roughened platinum layer; a roughened platinum layer having a continuous surface characterized by columnar platinum pedestals; the pedestals terminating in dome-shaped tops; and/or these pedestals having heights greater than or equal to about one-third of a total thickness of the platinum layer. For at least these reasons claim 44 can neither be anticipated nor rendered obvious in view of Inaba.

Claims 45-46 and 48 depend from claim 44 and are allowable for at least the reasons stated above regarding claim 44.

Applicant requests allowance of claims 29-37, 40-46, and 48 in the Examiner's next action. If the Examiner's next action is to be anything other than a Notice of Allowance, the Applicant respectfully requests a telephone interview prior to issuance of any such subsequent action. The undersigned is available for telephone consultation at (509) 624-4276 Monday through Friday, 8:00 a.m.-5:00 p.m. (PST).

Respectfully submitted,

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